AMENDMENTS TO THE CLAIMS

37 C.F.R §1.121(c)

The following is a listing of claims that replaces all prior versions, and listings, of claims in the application. Underlining denotes added text, and [[ ]] and strikethrough denote cancelled text.

1. **(Previously Presented)** An expression vector, comprising a nucleic acid encoding a polypeptide at least 72% identical to SEQ ID NO:4 operably linked to a heterologous promoter, wherein said nucleic acid encodes a protein having monooxygenase P450 activity.

2. **(Original)** The expression vector of Claim 1, wherein the monooxygenase P450 activity is ε-ring hydroxylase activity.

3. **(Original)** The expression vector of Claim 2, wherein the monooxygenase P450 activity further comprises β-ring hydroxylase activity.

4. **(Original)** The expression vector of Claim 1, wherein the monooxygenase P450 activity is β-ring hydroxylase activity.

5. **(Previously Presented)** The expression vector of Claim 1, wherein said nucleic acid sequence further encodes a polypeptide comprising a cytochrome P450 molecular oxygen binding pocket conserved consensus amino acid motif identical to SEQ ID NO:12.

6. **(Previously Presented)** The expression vector of Claim 5, wherein said nucleic acid sequence further encodes a polypeptide comprising a conserved transmembrane domain sequence identical to SEQ ID NO:10.

7. **(Previously Presented)** The expression vector of Claim 1, wherein said nucleic acid sequence further encodes a polypeptide comprising a conserved consensus cysteine motif identical to SEQ ID NO:14.

8. **(Previously Presented)** The expression vector of Claim 7, wherein said nucleic acid sequence further encodes a polypeptide comprising a conserved N-terminal transit peptide for chloroplast-targeting identical to SEQ ID NO:11.

9. **(Canceled)**.

10. **(Previously Presented)** The expression vector of Claim 1, wherein said nucleic acid sequence is SEQ ID 05.

11. **(Original)** The expression vector of Claim 1, wherein said vector is a eukaryotic vector.

12. **(Original)** The expression vector of Claim 11, wherein said eukaryotic vector is a plant vector.

13. **(Previously Presented)** The expression vector of Claim 12, wherein said plant vector is a T-DNA vector.

14. **(Original)** The expression vector of Claim 1, wherein said vector is a prokaryotic vector.

15. **(Previously Presented)** A nucleic acid sequence encoding a polypeptide having the sequence of SEQ ID NO: 04 operably linked to an heterologous promoter, wherein said nucleic acid sequence encodes a protein having ε-ring hydroxylase activity.

16. **(Previously Presented)** The nucleic acid sequence of Claim 15, wherein said promoter is a eukaryotic promoter.

17. **(Previously Presented)** The nucleic acid sequence of Claim 16, wherein said eukaryotic promoter is active in a plant.

18 – 20. **(Canceled).**

21. **(Previously Presented)** A transgenic plant comprising a nucleic acid sequence encoding a polypeptide having the sequence of SEQ ID NO:04, wherein said nucleic acid sequence encodes a protein having monooxygenase P450 activity, and wherein said nucleic acid sequence is heterologous to the plant.

22. **(Previously Presented)** The transgenic plant of Claim 21, wherein said transgenic plant is selected from the group consisting of *Brassicaceae, Poaceae, Fabaceae, Asteraceae, Solanaceae,* and *Volvocaceae* plants.

23. **(Original)** The transgenic plant of Claim 22, wherein said transgenic plant is a marigold.

24. **(Original)** The transgenic plant of Claim 21, wherein said transgenic plant is a crop plant.

25. **(Previously Presented)** A transgenic plant cell comprising a nucleic acid sequence encoding a polypeptide at least 72% identical to SEQ ID NO:04, wherein said nucleic acid sequence encodes a protein having monooxygenase P450 activity, and wherein said nucleic acid sequence is heterologous to the plant cell.

26. **(Previously Presented)** A transgenic plant seed comprising a nucleic acid sequence encoding a polypeptide having the sequence of SEQ ID NO:04, wherein said nucleic acid sequence encodes a protein having monooxygenase P450 activity, and wherein said nucleic acid sequence is heterologous to the plant seed.

27. **(Previously Presented)** A transgenic plant comprising a nucleic acid having the sequence of SEQ ID NO:05 operably linked to a promoter, wherein the nucleic acid sequence encodes a protein having ε-ring hydroxylase activity.

28. (**Previously Presented**) A method for altering the phenotype of a plant, comprising:

a) providing;

i) an expression vector comprising a nucleic acid sequence having the sequence of a SEQ ID NO:05; and

ii) plant tissue; and

b) introducing said vector into said plant tissue under conditions such that expression of said nucleic acid sequence alters the phenotype of a plant.

29. (**Previously Presented**) A method for altering carotenoid ratios, comprising:

a) providing a vector construct comprising a nucleic acid having the sequence of SEQ ID NO:05 wherein said nucleic acid sequence encodes a protein having ε-ring hydroxylase activity; and

b) producing a plant comprising the vector, wherein said plant exhibits altered carotenoid ratios.

30. (**Currently Amended**) A method for altering the carotenoid production of a plant, comprising:

a) providing;

i) an expression vector comprising a nucleic acid encoding a polypeptide ~~selected from the group consisting of~~ listed as SEQ ID NO:04 ~~and SEQ ID NO:01~~, wherein the nucleic acid sequence encodes a protein having ε-ring hydroxylase activity, and

ii) plant tissue; and

b) introducing said vector into said plant tissue under conditions such that the protein encoded by the nucleic acid sequence is expressed so that the plant tissue exhibits altered carotenoid production..

31. (**Currently Amended**) A method for producing lutein, comprising:

a) providing a transgenic host cell comprising a heterologous nucleic acid sequence, wherein the heterologous nucleic acid sequence encodes a polypeptide ~~selected~~

~~from the group consisting of~~ listed as SEQ ID NO:04 ~~and SEQ ID NO:01~~, under conditions sufficient for expression of the encoded protein; and

b) culturing said transgenic host cell under conditions such that lutein is produced.

32. (**Currently Amended**) A method for altering carotenoid production in a plant, comprising:

a) providing a transgenic plant comprising a heterologous nucleic acid sequence, wherein said heterologous nucleic acid sequence encodes a polypeptide ~~selected from the group consisting of~~ listed as SEQ ID NO:04 and SEQ ID NO:01, and

b) cultivating said transgenic plant under conditions sufficient for increasing ε-ring hydroxylated carotenes in the plant tissue.

33. (**Previously Presented**) The method of Claim 32, wherein said ε-ring hydroxylated carotenes is lutein.

34. (**Currently Amended**) A transgenic plant comprising a heterologous nucleic acid sequence encoding a polypeptide ~~selected from the group consisting of~~ listed as SEQ ID NO:04 ~~and SEQ ID NO:01~~.

35. (**Currently Amended**) A method for increasing ε-ring ~~hydroxlated~~ hydroxylated carotene production in a plant, comprising:

a) providing

i) plant tissue,

ii) a heterologous nucleic acid sequence, wherein said heterologous nucleic acid sequence encodes a polypeptide ~~selected from the group consisting of~~ listed as SEQ ID NO:04 ~~and SEQ ID NO:01~~, for increasing hydroxylated ε-ring carotenes; and

b) transfecting said plant tissue with said heterologous nucleic acid sequence; and

c) cultivating said transfected plant tissue under conditions sufficient for increasing ε-ring hydroxylated carotenes in the plant tissue.

36. **(Currently Amended)** The transgenic plant ~~tissue~~ of Claim 34, wherein said transgenic plant comprises transgenic plant tissue ~~produces 8% or less~~ that comprises 12.5 fold higher level of lutein as compared to lutein produced in a wild type plant tissue.

37. **(Canceled)**.